

CLAIMS

1. Apparatus (15) for distributing audio-visual content over at least two channels, the total channel rate being unpredictable, the apparatus comprising a coder (20-22) and a data buffer (23-25) for each channel, and a transmission controller (26) arranged to control the transmission of data from the buffers and to provide for the retransmission of data which is deemed not to have been received correctly, the apparatus comprising a joint bit-rate controller (27) arranged to control each of the coders to provide data at a rate which is dependent at least in part on a data production rate and on a data transmission rate.

2. Apparatus as claimed in claim 1, in which the coders are controlled to provide data at a rate which is dependent in part on the amount of data awaiting transmission.

3. Apparatus as claimed in claim 2, in which the coders are controlled to provide data at a rate which is dependent in part on the difference between the amount of data awaiting transmission and a target amount.

4. Apparatus as claimed in claim 3, in which the coders are controlled to provide data at a rate which is dependent on the difference multiplied by a control parameter.

5. Apparatus as claimed in any preceding claim, in which the joint bit rate controller is arranged to control each coder to provide data at a rate which is dependent in part on the complexity of the signal with which that coder is fed.

6. Apparatus as claimed in any preceding claim, in which the joint bit rate controller is arranged to control each coder to provide data at a rate

which is dependent in part on an average data transmission rate and an average data production rate.

7. Apparatus as claimed in claim 5, in which the joint bit rate
5 controller is arranged to control the coders to provide data at a rate which is dependent also on an estimated channel rate at a relevant time in the future.

8. Apparatus as claimed in claim 6, in which the estimated channel
rate is calculated from historical channel rate data.

10 9. Apparatus as claimed in any preceding claim, in which the joint
bit rate controller (27) is arranged to control a coder to provide data at a rate
which is dependent in part on the characteristics of the channel associated
with the coder.

15 10. Apparatus as claimed in claim 9, in which the joint bit rate
controller (27) is arranged to control the coder to provide data at a rate which
is dependent in part on the channel rate of the channel associated with the
coder.

20 11. Apparatus as claimed in claim 10, in which the channel rate is
calculated from the proportion of data bits transmitted to the total number of
transmitted units.

25 12. Apparatus as claimed in any preceding claim, in which the joint
bit-rate controller is arranged to apply a control signal to a control input of each
coder which determines directly the quality of encoding used.

30 13. Apparatus as claimed in any of claims 1 to 11, in which the joint
bit-rate controller is arranged to apply a control signal to a control input of each
coder which determines directly the output data rate of the coder.

14. Apparatus as claimed in any preceding claim, in which the transmission controller is an earliest deadline first scheduler.

15. A method of distributing audio visual content over at least two channels, the total channel rate being unpredictable, the method comprising providing a coder (20-22) and a data buffer (23-25) for each channel, controlling the transmission of data from the buffers and controlling the retransmission of data which is deemed not to have been received correctly, the method comprising controlling each of the coders (20-22) to provide data at a rate which is dependent at least in part on a data production rate and on a data transmission rate.

16. A method as claimed in claim 15, in which the controlling step comprises controlling the coders to provide data at a rate which is dependent in part on the amount of data awaiting transmission.

17. A method as in claim 16, in which the controlling step comprises controlling the coders to provide data at a rate which is dependent in part on the difference between the amount of data awaiting transmission and a target amount.

18. A method as in claim 17, in which the controlling step comprises controlling the coders to provide data at a rate which is dependent on the difference multiplied by a control parameter.

19. A method as in any of claims 15 to 18, in which the controlling step comprises controlling the coders to provide data at a rate which is dependent in part on the complexity of the signal with which that coder is fed.

20. A method as in any of claims 15 to 19, in which the controlling step comprises controlling the coders to provide data at a rate which is

dependent in part on an average data transmission rate and an average data production rate.

21. A method as in any of claims 15 to 20, in which the controlling
5 step comprises controlling the coders to provide data at a rate which is dependent also on an estimated channel rate at a relevant time in the future.

22. A method as claimed in any of claims 15 to 21, comprising
10 calculating the estimated channel rate from historical channel rate data.

23. A method as in any of claims 15 to 22, in which the controlling
step comprises controlling the coders (20-22) to provide data at a rate which is dependent in part on the characteristics of the channel associated with the
15 coder.

24. A method as claimed in claim 23, in which the controlling step
comprises controlling the coders (20-22) to provide data at a rate which is dependent in part on the channel rate of the channel associated with the
20 coder.

25. A method as claimed in claim 24, comprising calculating the channel
rate from the proportion of data bits transmitted to the total number of
transmitted units.